III. EXISTING SITUATION

A. MONTANA WATER LAW

1. Water Right Basics

Montana's legal framework for water rights is referred to as the prior appropriation doctrine. There are two general rules in the prior appropriation doctrine. These rules are expressed by the following easy to remember rhymes: "first in time, first in right" and "use it or lose it."

"First in time, first in right" relates to the priority date of a water right. The priority date of a water right generally refers to the date on which the water was first put to beneficial use. The earlier the priority date, the better the water right. A senior water right holder with an earlier priority date is entitled to use the full amount of his or her water right before any junior water right holder can use any water. In times of shortage, the senior water right can take all of the available water. There is no requirement that water be shared among the various users.

"Use it or lose it" refers to the requirement of beneficial use. A water right is not ownership of the water itself, but it is the right to use water beneficially. For example, if someone has the right to divert water for irrigation but is haying and does not currently need the water for beneficial use, he or she cannot continue to divert the water but must leave it in the stream for use by junior water rights holders. When water is no longer put to a beneficial use, it can be lost or abandoned. It typically takes at least 10 years of non use for the issue of abandonment to arise. Beneficial use is the "basis, measure, and limit" of a water right. In other words, if someone claims a water right for 200 miner's inches but has historically used only 100 miner's inches, that person's water right is only for the 100 miner's inches put to beneficial use.

While the basic rules of Montana water law are fairly simple, their actual application often becomes complicated. This section does not attempt to explain all of the nuances of Montana water law. A few selected topics, however, with particular application to the upper Clark Fork River Basin are described below.

2. Water Reservations

In 1973, the Montana legislature enacted the Water Use Act which drastically changed Montana's existing water law. While the basic rules of "first in time, first in right" and "use it or lose it" were retained, the Water Use Act added a number of new twists. The Water Use Act created a new type of water right referred to as a water reservation. Water reservations are available only to public entities, such as conservation districts, municipalities, and state and federal agencies.

Water reservations are different from traditional water rights in two key ways. First, traditional water rights could only be acquired if water was diverted or impounded. Before 1973, water rights could not be acquired for in-stream flows (with the exception of the Murphy Rights which are explained below). Water reservations, however, can be used for in-stream flows. In-stream flow water reservations have been issued to entities such as the DFWP and the DHES to maintain fisheries and dilute pollution. Second, due to the requirement of beneficial use, traditional water rights had to be put to use within a reasonable time or they were lost. Water reservations, on the other hand, can reserve water for the future needs of irrigation districts, municipalities, and other public entities.

The GCD and DFWP filed applications for water reservations in the upper Clark Fork River Basin. The application filed by the GCD seeks to construct, at some point in the future, a dam on the North Fork of Lower Willow Creek to provide supplemental irrigation water and a dam on Boulder Creek to irrigate new acres. The application filed by the DFWP seeks in-stream flows in the mainstem of the Clark Fork River and 17 of its tributaries. The DFWP did not apply to reserve water on the Blackfoot River or Rock Creek. Both of these applications were scheduled to go to a hearing in 1991.

The 1991 Montana legislature temporarily suspended action on the GCD and DFWP water reservation applications until June 30, 1995 while the upper Clark Fork River Basin comprehensive management plan is being written. The management plan recommends that the reservation applications continue to be suspended as long as the basin is closed to most new water uses.

If the reservation process is not suspended, it will proceed forward and a formal contested case hearing will be held on the applications and objections. The ultimate decision whether or not to grant the reservations is made by the Board of Natural Resources and Conservation. The board's decision can be appealed to the District Court and then to the Montana Supreme Court. Any reservation granted to the GCD or DFWP will have a priority date of May 1, 1991.

3. Basin Closure

Since the passage of the 1973 Water Use Act, a person cannot receive a new right to use water without first applying for and receiving a water use permit from the DNRC. Before the DNRC can issue a water use permit, the applicant must prove, among other things, that there is unappropriated water available for the new use and the new use will not adversely affect existing water rights. A basin closure essentially predetermines these issues and declares there is no water legally available for new uses, and therefore no reason to continue the permit process.

A basin closure prevents DNRC from issuing new water use permits. However, it does not affect the ability to change existing water rights. Basin closures are designed to protect existing water right holders by prohibiting new junior water uses and by eliminating the need to spend time and money objecting to proposed new uses on streams which are already over appropriated.

A basin may be closed by the DNRC or by the legislature. The upper Clark Fork River Basin was closed by the 1991 Legislature. This closure does not apply to the Blackfoot River or Rock Creek. A basin closure does not have to be permanent. The basin closure in the upper Clark Fork lasts until June 30, 1995. The management plan recommends the basin closure be extended to include the Blackfoot River and Rock Creek and that it continue indefinitely with periodic reviews.

A basin closure also does not have to apply to all water uses. For example, the current basin closure in the upper Clark Fork Basin does not apply to groundwater, water for domestic use, or water used in the Superfund Cleanup. The management plan recommends that stockwater, storage, groundwater for domestic use, expansion of hydropower generation at existing projects, and limited Superfund uses of water be exempted from the closure.

4. Changes to Existing Water Rights

Montana water law has always allowed changes to be made to existing water rights and water rights to be severed from the land. Since 1973, all changes must be pre-approved by the DNRC. Before a change can occur, the applicant who is proposing to change an existing water right must prove there will be no adverse affect to other water r holders. If objections are filed against a proposed change, the DNRC holds a contested case hearing before deciding whether to authorize the change. The DNRC's decision can be appealed to the District Court and then to the Montana Supreme Court.

The most common example of a water right change is moving a water right's point of diversion. Another example of a change may occur when irrigated farm land is subdivided The water right appurtenant to the subdivided land may be severed and sold to a neighboring irrigator. This example involves changes in the place of use and perhaps the point of diversion or place of storage. Before these changes could be authorized, the DNRC must determine whether the proposed change will increase the amount of water historically consumed by the water right. To do this, the DNRC considers the amount of water historically diverted, the efficiency of the irrigation system and means of delivery, the amount of water consumed by the crop, and the amount of return flow. The DNRC must calculate both historic water consumption and the expected consumption under the proposed change. If the proposed change will consume more water, it will be denied. The applicant has the burden of proving that consumption will not increase and no other water rights will be adversely affected.

5. In-stream Flows

In-stream flows can be protected using a number of different methods. This section refers only to in-stream flows for maintaining fisheries. The first method is referred to as a Murphy Right. Representative James Murphy was the sponsor of legislation passed in 1969 which allowed the DFWP to appropriate water on 12 Blue Ribbon trout streams. In the upper Clark Fork River Basin, the DFWP has Murphy Rights on the mainstem of the Blackfoot River from its mouth to the mouth of its North Fork, and on the mainstem of Rock Creek from its mouth to the junction of its east and west forks. The priority date for these Murphy Rights is January 1971. The amount of water claimed by the DFWP for these Murphy Rights depends on the time of year and largely follows the streamflow hydrograph.

The second method is a water reservation. To date, in-stream flow water reservations have been granted in the Yellowstone River Basin and in the upper Missouri River Basin above Fort Peck Dam. As described above, the DFWP's in-stream flow water reservation application for the upper Clark Fork River Basin is temporarily suspended. The DFWP did not apply for a water reservation on the Blackfoot River or Rock Creek because it already has Murphy Rights on those streams.

The third method is a water lease. The 1989 Legislature created a temporary program allowing the DFWP to lease existing water rights for in-stream flow purposes. The leases are restricted to 20 designated streams. Most leases can last no more than 10 years, renewable once for an additional 10 years. If, however, the leased water is made available through the development of a water conservation or storage project, the lease can last twenty years.

Before a lease can go into effect, it must go through the change process, and the DFWP must prove there will be no adverse affect to other water rights. If a lease is approved, the DFWP can protect the full amount of the leased water right to its point of diversion, but downstream from the point of diversion the DFWP can only protect the amount of water which was historically consumed. To date, the DFWP has entered into two leases on Mill Creek, a tributary to the Yellowstone River., and one on Blanchard Creek, a tributary to the Clearwater River in the Big Blackfoot watershed. Several other leases have been negotiated but not finalized. Of the seven streams which have been designated for leasing, only one, Blanchard Creek, is in the upper Clark Fork River Basin. Blanchard Creek is a tributary to the Clearwater River, which is a tributary of the Blackfoot River. No objections were filed against the change applications for the Mill Creek and Blanchard Creek leases, and the changes have been authorized by the DNRC.

This plan proposes a pilot project to test another method of obtaining a water right for in-stream flow. The pilot project would allow a public or private entity to lease an existing water right for in-stream flows from a willing lessor, or allow an existing right holder to convert an existing right to an in-stream use, and then protect the lease or conversion against appropriation by junior users for the period of the study.

6. Adjudication

All water rights with a priority date before July 1, 1973, except for some domestic groundwater and stockwater rights, are currently being adjudicated by the Montana Water Court. The adjudication involves a number of different stages including the filing of water right claims, verification of those claims by the DNRC, the issuance of a temporary preliminary decree followed by the filing of objections and the holding of hearings, the issuance of a preliminary decree followed by another round of objections and hearings, and the issuance of a final decree.

The adjudication began with the filing of claims for pre-July 1, 1973 water rights. All water right claims were to be filed by April 30, 1982. The 1993 Legislature set a new deadline, July 1, 1996, for the filing of additional water right claims. Any water right claim filed after April 30, 1982 is subject to special restrictive rules. If a water right claim is not filed by July 1, 1996, the water right will be forfeited.

After the water right claims are filed, the next stage in the adjudication is verification. In this stage, the DNRC reviews or verifies all of the water right claims and indicates any perceived problems with the claims. For example, the DNRC may indicate that a claim includes more acres than appear to be actually irrigated.

After verification, the Water Court combines the water right claims and the DNRC's verification comments into a temporary preliminary decree. The temporary preliminary decree includes all of the water rights in a basin except for federal and tribal reserved water rights. After the issuance of a temporary preliminary decree, there is a period for filing objections against the various water right claims. If a water user does not want to formally object, but wants to participate in the adjudication of a particular claim, the water user may file a notice of intent to appear. After the deadline expires for filing objections and notices of intent to appear, the water court begins to resolve the various objections. If an objection cannot be resolved between the parties, the water court will hold a hearing and rule on the validity of the contested water right.

While all of this is going on in the water court, the State of Montana, through the Montana Reserved Water Rights Compact Commission, is attempting to negotiate the extent of federal and tribal reserved water rights with the federal government and the tribes. At some point, either through successful negotiation or through recognition that negotiation will not work, the federal and tribal reserved water rights will be combined with the other water rights in the basin, and a preliminary decree will be issued. Objections can then be filed against water right claims contained in the preliminary decree. Notices of intent to appear can also be filed. After the objections and notices of intent to appear are filed, the water court will once again proceed to resolve the objections through hearings, if necessary. Once all of the objections to the preliminary decree are resolved, a final decree is issued and the adjudication is complete.

The adjudication is in various stages of completion throughout the upper Clark Fork River Basin. The basin has been divided into four subbasins for the purposes of the adjudication. The four subbasins are Basin 76GJ, which includes Flint Creek and its tributaries; Basin 76E, which includes Rock Creek and its tributaries; Basin 76F, which includes the Blackfoot River and its tributaries; and Basin 76G, which includes the Clark

Fork River above Milltown Dam and all of its tributaries except for the Blackfoot River, Flint Creek, and Rock Creek.

A temporary preliminary decree was issued for Basin 76GJ (Flint Creek) on March 29, 1984. Objections to the temporary preliminary decree had to be filed by September 3, 1984. Notices of intent to appear had to be filed by December 31, 1984. According to the Water Court, most of the objections to the temporary preliminary decree have been resolved. One of the remaining unresolved objections was filed by the Confederated Salish and Kootenai Tribes against general language in the decree. Another unresolved objection was filed by the U.S. Government concerning its claims for certain groundwater wells. In addition, the resolution of a few water rights, such as the Montana Power Company's water right for storage at the Flint Creek Dam, have been stayed and will not be immediately decided.

A temporary preliminary decree was issued for Basin 76E (Rock Creek) on March 29, 1984. Objections to the temporary preliminary decree had to be filed by August 20, 1984. Notices of intent to appear had to be filed by November 23, 1984. According to the Water Court most, if not all, of the objections to the temporary preliminary decree have been resolved.

No decrees have been issued for Basin 76F (Blackfoot River). The Water Court has not set a date for the issuance of a temporary preliminary decree. Before a temporary preliminary decree can be issued, the Missoula DNRC Regional Office must review and verify all of the filed water right claims. The Missoula Regional Office is currently working on the southern Bitterroot River and will not begin to verify the Blackfoot River for a number of years.

A temporary preliminary decree was issued for Basin 76G (Upper Clark Fork) on May 17, 1985. Objections to the temporary preliminary decree had to be filed by December 17, 1985. Notices of intent to appear had to be filed by April 22, 1988. Water rights are, and have always been, vigorously disputed in this basin. These disputes, along with personnel turnover in the water court, have slowed down the adjudication of this basin. Water Master Kathryn Lambert has been assigned to adjudicate Racetrack and Dempsey creeks. Water Master Doug Ritter is currently working on objections in the Little Blackfoot drainage. The other streams have been assigned to either Chief Water Judge C. Bruce Loble or another water master.

Once all of the objections to a temporary preliminary decree have been resolved, the next step in the adjudication process is to issue a preliminary decree. Preliminary decrees will include federal and tribal reserved water rights, such as those claimed by the U.S. Forest Service and the Confederated Salish and Kootenai Tribes. At this time, there are no on-going negotiations specifically addressing federal and tribal reserved water rights in the upper Clark Fork River Basin. The Montana Reserved Water Rights Compact Commission is negotiating with the U.S. Forest Service to determine how to address the many issues raised by the Forest Service's reserved water right claims throughout the state. There has been no discussion of the Forest Service's reserved water rights in particular basins. The current deadline for completion of the Compact Commission's negotiations is July 1, 1999. This deadline may or may not be extended. Due to the complication of federal and tribal reserved water rights, it will likely be many years before any preliminary decrees are issued in the upper Clark Fork River Basin.

7. Enforcement of Water Rights

Montana follows the prior appropriation doctrine. One of the basic rules of the prior appropriation doctrine is "first in time, first in right." A senior water right user with an earlier priority date is entitled to be fully satisfied before any junior water right user can appropriate water. In times of water shortage, the senior water right holder can take all of the water. As a result, the priority date is usually the most important part of a water right.

Despite the value of an early priority date, it is not always easy to enforce the priority of a water right. In Montana, enforcement is generally the responsibility of the individual water right holder. If any type of legal action has to be filed, or a water commissioner has to be hired, the individual water right holders must pay the costs.

One method to enforce water rights is the appointment of a water commissioner. A water commissioner can only be appointed on decreed streams, usually those streams which were decreed by district courts in the early 1900s. Many tributaries in the upper Clark Fork River Basin have been decreed and have water commissioners appointed every year. A water commissioner distributes water according to the priorities in the decree. A water commissioner is usually appointed by the district judge at the request of a petition signed by the water users. The cost of the water commissioner is paid by the water users pro rata based on the amount of water they use.

The mainstem of the upper Clark Fork River and a good number of its tributaries have not been decreed. Since there is no decree, a water commissioner cannot be appointed. Once all of the objections to a temporary preliminary decree have been resolved by the water court, a water commissioner can be appointed to distribute water in accordance with the temporary preliminary decree.

Enforcing a nondecreed water right is generally more difficult than a decreed water right. There are, however, a number of methods which can be used to enforce both decreed and nondecreed water rights. One method is to make a call on a junior water right holder. A call is made by instructing the junior user to stop taking water so that the water can be used by a senior user. Many water rights are enforced through voluntary compliance with calls made by senior users. If, however, a call is made and the junior water user refuses to stop using water, the senior user may have to go to court and seek an injunction ordering the junior user to stop taking water. This can be an expensive, time consuming process.

A relatively new enforcement method is to seek enforcement by the DNRC. Before contacting the DNRC for enforcement, the senior water user must make a call on the junior users. If a junior user refuses to honor the call, the senior user should document this through photographs or other methods. The senior user can then contact the DNRC. The DNRC will first attempt to obtain voluntary compliance. If the junior user does not voluntarily comply within three working days, the DNRC can seek a $1,000 penalty per day for each day that the violation continues.

Another new enforcement method is to seek the appointment of a water mediator. Water mediators can be appointed by a district court judge upon the judge's discretion, upon the request of the governor, or by petition of at least 15 percent of the owners of the affected water rights. A water mediator has no authority to impose a settlement on the parties, but may assist the parties in agreeing how water is to be used. If no agreement is reached, the parties are free to pursue any other means of enforcing their water rights.

B. WATER QUALITY STANDARDS

1. Definition and Purpose

The Montana Water Quality Act is the foundation for the state's water pollution control program. The Act states: "It is the public policy of this state to: (1) conserve water by protecting, maintaining, and improving the quality and potability of water for public water supplies, wildlife, fish and aquatic life, agriculture, industry, recreation, and other beneficial uses; and (2) provide a comprehensive program for the prevention, abatement, and control of water pollution." (Section 75-5-103 MCA, revised 1991). The Water Quality Division of the Montana Department of Health and Environmental Sciences is responsible for the administration of the Montana Water Quality Act.

The Act requires that our state waters be maintained and protected as multiple-use resources. When state waters are used for a beneficial purpose, the quality in which they are returned after use must not impair the receiving water's assigned beneficial use. This important water quality protection requirement necessitates wise water use management and wastewater treatment practices.

Public water supply and other domestic purposes; industrial water supply; agricultural use; recreation and fish, wildlife, and other aquatic life needs have been recognized as legitimate beneficial uses of state waters important to our quality of life. Enforceable water quality standards are the yardstick used in protecting waters. The standards designate specific water use classifications for all surface and groundwater in the state and establish criteria for protecting and improving their quality and potability. The standards also establish waste treatment requirements and serve as a frame of reference for determining the occurrence of water pollution. Water pollution is regarded as any contamination or other alteration of the physical, chemical, or biological properties of any state waters which exceeds the water quality standards or impairs a prescribed beneficial use.

Montana's water quality standards for surface waters are a combination of drinking water, aquatic life, and water and fish ingestion numeric standards, as well as the prohibition of specific practices that degrade water quality. Surface water quality standards and prohibited practices are defined in the Administrative Rules of Montana (ARM) as adopted by the Montana Board of Health and Environmental Sciences (ARM 16.20.601 et seq., revised June 1988).

For groundwater, the applicable standards are currently limited to the primary drinking water standards established by the Environmental Protection Agency under the Safe Drinking Water Act. Montana has adopted these standards for all groundwater in the state (ARM 16.20.1003). Rule changes are anticipated in 1994 that will add additional human health-based standards for pollutants in groundwater.

The Nondegradation Rules are a part of the water quality standards that apply to new or increased sources of pollution. These rules prohibit increasing concentrations of toxic and deleterious materials in state waters, unless it is affirmatively demonstrated to the Department of Health and Environmental Sciences that a change is justifiable as a result of necessary economic or social development and will not preclude present or anticipated uses of these waters.

2. Clark Fork Basin Water Quality Standards Designations

Surface waters in the upper Clark Fork Basin are classified as A, B, C, or I class waters (ARM 16.20.604). Each of these classes of water is defined in the standards as being supportive of various beneficial uses, and containing at least the minimum level of water quality necessary to support those uses. Water use descriptions for different water classifications in the upper Clark Fork Basin and the corresponding surface waters of the basin falling within those classes are described in Table 3. Table 4 shows total stream miles and lake acres in the upper Clark Fork Basin designated as suitable for the various beneficial uses prescribed in the standards.

Table 3. Water use classifications and corresponding definitions for surface waters of the upper Clark Fork Basin. Source: Montana Surface Water Quality Standards, Administrative Rules of Montana, Title 16, Chapter 20.

<u>16.20.616 A-CLOSED CLASSIFICATION</u>: Waters classified A-Closed are suitable for drinking, culinary and food processing purposes after simple disinfection. Water quality is suitable for swimming, recreation, growth and propagation of fishes and associated aquatic life, although access restrictions to protect public health may limit actual use of A-Closed waters for these uses. A-Closed waters in the upper Clark Fork Basin include: the Yankee Doodle Creek drainage to and including the North Butte water supply reservoir, the Basin Creek drainage to and including the South Butte water supply reservoir, the Tin Cup Joe Creek drainage to the Deer Lodge water supply intake, and Fred Burr Lake and its headwaters from its source to the outlet of the lake (Philipsburg water supply intake).

<u>16.20.617 A-1 CLASSIFICATION</u>: Waters classified A-1 are suitable for drinking, culinary and food processing purposes after conventional treatment for removal of naturally present impurities. Water quality must also be suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. A-1 waters in the upper Clark Fork Basin include: the Warm Springs Creek drainage to Myers Dam near Anaconda, Georgetown Lake and its tributaries above Georgetown Dam (headwaters of Flint Creek drainage), and the South Boulder Creek drainage to the Philipsburg water supply intake.

<u>16.20.618 B-1 CLASSIFICATION</u>: Waters classified B-1 are suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. All of the Clark Fork River and its tributaries except those reaches classified as A-Closed, A-1, C-1, or C-2 are classified as B-1 waters.

<u>16.20.621 C-1 CLASSIFICATION</u>: Waters classified C-1 are suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life; waterfowl and furbearers; and agricultural and industrial water supply. The Clark Fork River mainstem from Cottonwood Creek (near Deer Lodge) to the Little Blackfoot River is classified C-1.

<u>16.20.622 C-2 CLASSIFICATION</u>: Waters classified C-2 are suitable for bathing, swimming and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. The Clark Fork River from Warm Springs Creek to Cottonwood Creek is classified C-2.

<u>16.20.623 I CLASSIFICATION</u>: The goal of the State of Montana is to have these waters fully support the following uses: drinking, culinary and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. Silver Bow Creek from the confluence of Blacktail Deer Creek to Warm Springs Creek is classified I. Although Silver Bow Creek currently cannot support most of the above-mentioned uses, the goal is to gradually improve water quality. An analysis will be performed during each standards review period to determine the factors preventing or limiting the attainment of these uses. Permittees who discharge to Class I waters cannot degrade water quality below existing conditions.

Table 4. Total stream miles * and lake acres ** in the upper Clark Fork Basin classified according to the various uses prescribed in the Montana Surface Water Quality Standards.

Classified Use	Total Size Classified for Use Stream Miles	Lake Acres
Fish and Wildlife	4427 a	14919
Domestic Water Supply	4389 b	14919
Recreation	4427 a	14919
Agriculture	4412	14769
Industrial	4412	14769

* Includes perennial stream miles only. Excludes 3819 miles of intermittent streams and 302 miles of ditches and canals.

** Includes 421 lakes, reservoirs and ponds in excess of 5 acres size.

a Includes 33.2 miles of I Class stream (Silver Bow Creek) where this use is a goal.

b Excludes 37.8 miles of the Clark Fork River classified C-1 and C-2, which are not considered suitable for drinking, culinary and food processing purposes; includes 33.2 miles of I stream (Silver Bow Creek) where domestic water supply is a goal but not an existing use.

C. BASIN HYDROLOGY

"Hydrology" is the study of how water enters, flows through, and departs from a given area. The upper Clark Fork Basin is an area of about 6,000 square miles draining the western slope of the Northern Rockies. It is defined for purposes of this plan as all the drainage area above Milltown Dam. The area is primarily mountainous and forested, with several interspersed valleys that accommodate the most intensive human land and water uses. Elevations range from over 10,600 feet above mean sea level on the southern boundary in the Pintler Wilderness to about 3,250 ft. at Milltown Dam.

Because the upper Clark Fork is a "headwater" drainage, almost all of the water entering the basin does so as rain and snow. Average annual precipitation varies from a little over 10 inches in the upper Deer Lodge valley to over 60 inches on some peaks on the northern boundary of the Blackfoot Basin.

The average annual volume of water leaving this area through the river is about 2.1 million acre-feet, based on USGS records dating back to 1929 (Montana Power Company has records prior to 1929 for Milltown Dam). The maximum yearly outflow during the 1929 to 1993 period was 3.7 million acre-feet (af) in 1976, and the minimum was .97 million af in 1941. The highest recorded instantaneous flow was 48,000 cubic feet per second (cfs) recorded by MPC in 1908, and the lowest is 115 cfs in 1943. Although these extremes underscore the variation of flows, by Montana standards the upper Clark Fork Basin is a fairly stable stream, particularly below the confluence of Rock Creek and the Blackfoot River.

Understanding what water enters and leaves the upper Clark Fork on average, is the easy part of understanding the basin's hydrology. More difficult (and more relevant for the people who live there) is understanding the influences on the amount and distribution of water "flowing through it." When considering streamflows in this region, it is also important to recognize that averages are statistical creations seldom experienced. Flows vary significantly by year and by season, and it is the low probability events for which people must plan and manage their water uses.

This narrative follows the common conception that water occurs and flows through the basin either under or across the surface of the land. It is important to recognize, however, that this distinction is artificial. Surface water becomes groundwater, and groundwater becomes surface water. When someone affects surface water supplies or quality, secondary effects are likely to be seen in time to groundwater, and vice versa. Unfortunately, the linkages between surface and ground water are seldom understood sufficiently to be precisely quantified.

1. Groundwater

Groundwater occurs in the pore spaces, fractures, and voids in rock, soil, and sediment formations throughout the upper Clark Fork Basin. Typically, groundwater is thought of in terms of aquifers with defined boundaries, but groundwater also includes shallow, vagrant soil moisture that will rejoin surface or groundwater or be taken up by the roots of plants.

The aquifers of the upper Clark Fork can be subdivided into four categories described in greater detail below: 1) bedrock aquifers, 2) tertiary basin fill aquifers, 3) glacial aquifers, and 4) alluvial aquifers. Again, remember that these categories are not completely distinct. Water may move between them although the time frames involved in doing so may be great.

In general terms, groundwater originates from water infiltrating the ground from snow, rain, and streams. Groundwater tends to move from highlands to low areas, where it often discharges to streams and springs, is used by plants, or evaporates. The movement, amount, and quality of groundwater at any location depends on the type, structure, and hydraulic properties of the rocks, soils or sediments present, and on the climate, landforms, and other natural features. To a lesser extent than surface water, it is also influenced by human activities.

a. Bedrock Aquifers

Bedrock is a term used to describe solid rock, commonly covered by soil or other uncompacted materials such as sand, gravel, and clay. Bedrock forms the core of all mountainous areas of the basin, and is present deep below younger deposits in valleys. In the upper Clark Fork Basin, the most common types of bedrock are: Precambrian age (more than 570 million years old) metasedimentary rocks; Paleozoic and Mesozoic age (about 65 million to 570 million years old) marine and terrestrial sandstones, shales, and carbonate rocks; and igneous rocks of various ages. The water bearing capacities of bedrock formations depends on whether the rock is porous, fractured, or cavernous. The source of groundwater recharge in these aquifers is largely from infiltrating water from mountain snowpack and precipitation. Water quality is usually very good.

The Precambrian metasedimentary rocks are typically highly compacted, nonporous rocks that are fractured. These extremely old rocks have been deeply buried, subjected to considerable heat and pressure (hence the term metasedimentary), and later uplifted and moved during mountain building processes. These rocks include the maroon, pale green, and lavender hardened siltstones (argillites) visible in rock outcrops in Hellgate

Canyon and forming Mount Sentinel east of Missoula. These rocks, known to geologists as Belt rocks, are among the oldest in the world in which sedimentary features such as bedding planes, ripple marks, and even casts of salt crystals are preserved. The Sapphire Mountains, the Mission Mountains, the Swan Range, and northern parts of the Garnet Range are underlain largely by Belt rocks. Belt rocks are not very porous, and groundwater occurs principally in fractures. Well yields are variable, but generally small, ranging from 1 to 35 gallons per minute (gpm).

Paleozoic and Mesozoic age marine and terrestrial rocks occur mainly in southern parts of the Garnet Range and along the flanks of the Flint Creek Range. These rocks were warped, folded and sheared by mountain forces. Their water bearing capacities are dependent on the type of rock, degree of fracturing, geologic structure, and topographic setting. Limestone and sandstone formations are typically moderate to good aquifers, while shale formations may yield little or no water. Well yields are variable, ranging from 5 to 100 gpm. A particularly thick sequence of fractured and cavernous limestone and dolomite formations known as the Madison Group is an unusually productive aquifer that is found in some parts of the basin.

Igneous rocks include volcanic rocks (molten rock that solidified at or near the surface) and plutonic rocks (molten rock that solidified at depth). The core of the Garnet Range, some areas west of Flint Creek, the mountains east of Deer Lodge, and the Highland Mountains south of Butte contain large areas of volcanic rock. Plutonic rocks, largely granite, form the core of the Flint Creek Range and the mountains east of Deer Lodge. Like Belt rocks, groundwater occurs principally within fractures. Well yields average as little as 2 to 5 gpm.

b. Tertiary Basin Fill Aquifers

In geologic time, the period lasting from 2 million to 65 million years ago is called the Tertiary Age. At the onset of this period, the major tectonic activities that form much of the regional landscape were taking place. Climate changes were extreme during this period, varying from times of abundant water, warm temperatures, and lush vegetation to times of very dry conditions. Volcanoes were active in the upper Clark Fork.

During much of the Tertiary Age, mountainous areas were eroded and sediments accumulated in the wider valleys of the basin, including the Silver Bow, Deer Lodge, Flint Creek, Philipsburg, Blackfoot, and Nevada Creek valleys. The deposited sediments consist of uncompacted or poorly compacted clay, silt, sand, and gravelly materials in horizontal to slightly tilted layers. They also include beds of volcanic ash. Through geophysical studies and scant drillhole data, it is estimated that these materials are nearly 12,000 feet thick in central portions of the larger valleys.

The water yield of Tertiary fill sediments in the basin vary from 5 to 35 gpm, although drilling a dry hole is not an unexpected occurrence. In some areas of the basin thick, gravelly saturated sediments have provided enough water to operate large sprinkler irrigation systems. Water enters the Tertiary sediments via seepage from streams, overlying alluvial aquifers, precipitation, and irrigation activities. Water quality depends on the location and depth of the well, the types of sediments present, and the proximity to fresh water recharge sources. Water quality is fair to good for domestic and stockwater purposes, but may be susceptible to degradation by human activities.

c. Glacial Aquifers

Many of the higher, more rugged mountainous areas were glaciated during the ice ages which lasted from about 10,000 to 2 million years ago. Large sheets of ice extended into the Blackfoot Valley (especially the Clearwater Junction and Ovando areas) from the north. The glaciers carved large amounts of material from surrounding landscapes and transported it downhill. The deposits left by these glaciers are complicated mixtures of poorly sorted debris (glacial till), gravelly outwash, and glacial lake sediments. The water bearing properties are as variable as the nature of the deposits. They yield good quality water for wells in limited portions of the upper Clark Fork Basin.

d. Alluvial Aquifers

Alluvium consists of loosely compacted gravel, sand, silt, and clay deposited by streams. These sediments are present beneath the flood plains of streams and are layered and highly variable from one location to another within the floodplain. Alluvial aquifers are excellent water sources and the most extensively used aquifer type in the upper Clark Fork Basin. Water yields in alluvial sediments can be very large, as much as 1,000 gpm or more in a properly designed, large diameter well.

Groundwater in alluvial aquifers is hydraulically connected to streams, and water levels and movement are affected by stream conditions. The relationships between alluvial groundwater and streams can be complicated and vary both by location and time. Some stream reaches may always gain water from adjacent alluvial aquifers while other reaches always lose water. In many areas the relationship shifts due to natural or human induced conditions, including seasonal variations in precipitation and streamflow, irrigation activities, groundwater withdrawals, and wastewater treatment. Because of the shallow nature of alluvial sediments, shallow water depths, and concentrated human populations in the valleys, alluvial aquifers are particularly susceptible to contamination.

2. Surface Water

Surface water flows in the upper Clark Fork are dominated by snowmelt. In an average year, about 24 percent of the annual runoff occurs in June, 22 percent in May, 10 percent in April, and 9 percent in July. The other eight months contribute between three and five percent each. The periods of greatest consumptive demand for water do not coincide exactly with when water is available. The critical months, when demands put the greatest pressure on supplies, are July and August.

The amount of water varies over time within the upper Clark Fork Basin, but also varies from place to place. For this reason, more specific hydrologic information is presented below by six watersheds that together comprise the larger surface water picture. The total outflows and monthly averages are based on USGS recorded flows for the 14-year period of record from October 1, 1978 through September 30, 1992. This period was a somewhat drier than average periods of the same length from recent history.

a. Upper Clark Fork Mainstem and Tributaries

This watershed includes several significant tributaries including Silver Bow Creek, Warm Springs Creek, Lost Creek, Racetrack Creek, Dempsey Creek, Tin Cup Joe Creek, and Cottonwood Creek. It comprises about 1,100 square miles (sq. mi.), or 18.3 percent of the total upper Clark Fork, but contributes only about 11.8 percent of the total average flow. In other words, it is one of the drier and most heavily water-depleted areas in the basin. At Deer Lodge, the average monthly flow of the mainstem in July is 205 cubic feet per second and 94 cfs in August. The lowest recorded daily average flow at this site was 22 cfs on August 18, 1988, while the highest daily average was 2,390 cfs on May 23, 1981.

b. Little Blackfoot River

The Little Blackfoot watershed is a little over 400 sq. mi., or 6.7 percent of the basin. It yields 5.5 percent of the basin outflow. At its mouth, the average monthly flow in July is 120 cfs, and in August is 51 cfs. Major tributaries are Dog Creek, Snowshoe Creek, Spotted Dog Creek, and Threemile Creek. On August 21, 1988 the recorded flow was only 10 cfs, while the peak recorded discharge was 6,280 cfs on May 21, 1981.

c. Flint Creek

The Flint Creek watershed is almost 500 sq. mi., or 8.3 percent of the total basin. Water is diverted from the East Fork of Rock Creek in the Rock Creek watershed to the Flint Creek watershed. Major tributaries of Flint Creek are Trout Creek, Fred Burr Creek, Marshall Creek, Boulder Creek, Douglas Creek, and Lower Willow Creek. Flint Creek is the most heavily developed watershed in the basin for irrigation.

There is no long-term flow measurement station at the lower end of Flint Creek, so the outflow is estimated to be 5 percent of the total average annual flow at Milltown Dam based on measurements of the Clark Fork above and below the Flint Creek confluence. Based on this estimate, the average July flow is 130 cfs and for August, 67 cfs. The lowest daily mean would be 22 cfs, and the highest daily average would be 1,650 cfs.

d. Rock Creek

Rock Creek contributes about 18 percent of the total basin flow while comprising only about 15 percent of the basin's total area, not counting the flows its exports to Flint Creek. It's major tributaries are the East Fork, Middle Fork, Ross Fork, West Fork, and Willow Creek, although it has numerous other perennial tributaries. Average monthly flows are 595 cfs for July and 285 cfs for August. The lowest recorded daily average flow was 45 cfs on February 4, 1989. The highest daily average flow was 5,330 cfs on June 20, 1975.

e. Blackfoot River

The Blackfoot River's drainage area is about 38 percent of the total basin, but it provides about 52 percent of the total flow at Milltown Dam. The flow of the Blackfoot River is actually larger than that of the Clark Fork River at its confluence with the Clark Fork River. Major tributaries include Nevada Creek, Douglas Creek, Monture Creek, Clearwater River, Elk Creek, Union Creek, and Gold Creek, to name but a few of the major perennial streams. July average monthly flows are 1,485 cfs; for August the figure is 730 cfs. The highest daily average flow at Bonner was 18,000 cfs on June 10, 1964. The lowest daily average was 200 cfs on January 4, 1950.

f. Lower Clark Fork Mainstem

This watershed includes all the area that drains into the Clark Fork mainstem between the mouths of the Little Blackfoot and Big Blackfoot rivers, exclusive of Flint Creek and Rock Creek. Significant tributaries include the "other" Rock Creek, Gold Creek, Hoover Creek, Harvey Creek, and Bear Creek. This area comprises about 13.7 percent of the basin total, but generates only about 8 percent of the total outflow. It is lower in elevation, receives less precipitation, and would be expected to generate less water. Average July flows above the Big Blackfoot are 1,300 cfs. August average flows are 630 cfs. The average monthly accretion of flows to this section of the river (excluding contributions from the Upper Clark Fork Mainstem, Little Blackfoot, Flint Creek, and Rock Creek watersheds) are 350 cfs in July and 133 cfs in August.

D. WATER QUALITY

The Clark Fork is Montana's largest and perhaps most abused river. Beginning as a small stream at the confluence of Silver Bow and Warm Springs creeks in the Deer Lodge Valley, the Clark Fork River rapidly gains size and volume from the inflows of numerous tributaries in its 22,000 square mile drainage area. Its average discharge at the Montana-Idaho border is 22,060 cubic feet per second (cfs); flows as large as 153,000 cfs have been recorded. Just across the Idaho border, the river provides greater than 90 percent of the inflow to Pend Oreille Lake, a very deep and scenic natural lake that is an important recreational and economic asset to northern Idaho.

More than a century of mining and smelting, agriculture and timber harvesting, hydropower development, and population growth have impacted water quality in Clark Fork River in Montana. The upper river has long been polluted with toxic metals, sediment, and nutrients and has been subject to significant dewatering. The consequences to the upper river are impaired fisheries, excessive developments of river algae, and a contaminated public water supply.

In the middle Clark Fork River, from Milltown Dam to the Flathead River, water quality is much improved. However, the more subtle effects of municipal and industrial wastewater discharges to this reach are cause for concern. The middle river is enriched with nutrients and dissolved oxygen levels periodically fall below state standards. Trout population densities are lower than the river's potential and aesthetic problems reduce the river's recreational appeal.

The lower Clark Fork, from the Flathead River to the Idaho border, contains water of excellent chemical quality. A series of hydroelectric dams which have altered natural streamflows and fisheries. The planned development of a large metals mine in the lower river basin has also caused considerable debate because many tributaries in this reach lack natural buffering capacity and have aquatic communities particularly susceptible to metal toxicity problems.

In Idaho, the rate of nutrient loading from the Clark Fork to Pend Oreille Lake has been a significant concern because it may cause, or at least contribute to, accelerated eutrophication or enrichment and the attendant problems of algae blooms and clouded water. Maintaining or reducing nutrient inputs from sources within Montana's portion of the Clark Fork Basin is important to Idahoans working to control nutrient inputs from shoreline areas of Pend Oreille Lake and other tributary drainages.

In sharp contrast to the mainstem Clark Fork River, many tributaries in the 22,000 square mile watershed area sustain excellent water quality. Several, especially in the Blackfoot, Bitterroot, and Flathead watersheds, originate within protected wilderness areas or national parks and have essentially pristine quality. Some less-protected tributaries with a history of good resource stewardship continue to exhibit excellent water quality, blue ribbon-class fisheries, and full support of designated water uses. The majority of tributary watersheds have fair to good water quality and suffer from varying amounts of nonpoint source, or diffuse, pollution resulting from a variety of land use practices.

Silver Bow Creek, one of two headwater tributaries of the Clark Fork, has perhaps the poorest water quality of any tributary or mainstem segment in the entire Clark Fork drainage. Its quality more closely resembles industrial or municipal wastewater than a Montana headwaters stream. Silver Bow Creek was reclassified several years ago to an "I" Class stream in Montana Water Quality Standards. This classification reflects the state's goal to improve water quality to support the following uses: drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

Silver Bow Creek currently cannot support most of these uses because of heavy metals pollution resulting from former mining and mineral processing operations and inadequate dilution of the Butte municipal sewage discharge.

The upper Clark Fork has variable water quality classifications to reflect variable water quality conditions and problems. From its point of origin below Warm Springs Creek to Cottonwood Creek at Deer Lodge, the river is classified "C-2", which means that it is to be maintained as suitable for: bathing, swimming, and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

From Cottonwood Creek to the Little Blackfoot River, the Clark Fork is classified "C-1", which is similar to "C-2" but with "marginal" removed from the statement pertaining to the propagation of salmonid fishes and associated aquatic life. From the Little Blackfoot River to Milltown Dam, the classification of the Clark Fork improves to "B-1", which specifies that "C-1" uses shall be protected plus drinking, culinary, and food processing uses after conventional treatment.

The water quality standards reflect generally improving water quality conditions in the upper Clark Fork Basin with increasing distance from its headwaters region. However, the intended beneficial water uses are not always supported due to a variety of problems.

The metals sources in the headwaters region and metals deposits in floodplains of the upper Clark Fork cause criteria designed to protect aquatic life to be exceeded seasonally. Periodic fish kills have been documented above Deer Lodge. Nutrient additions from municipal sewage discharges, agricultural nonpoint sources, and natural sources promote the development of excessive quantities of filamentous algae.

Dewatering of the river for irrigation is an on-going problem, and summer water temperatures periodically exceed applicable water quality standards designed to protect trout. The groundwater adjacent to Milltown Reservoir has been contaminated with arsenic as a result of river-borne tailings material that has concentrated behind the dam.

Nonpoint source pollution resulting from an economic base centered around agriculture, timber harvesting, and mining is a major problem throughout the upper basin, both in the tributaries and along the mainstem. Other water quality problems in the upper Clark Fork Basin are more localized in nature and include discharges of toxic substances (ammonia) from municipal wastewater treatment facilities and an abandoned post and pole operation, stream channelization, and other habitat alterations.

Throughout the Clark Fork Basin, there is a high degree of public concern for water quality and quantity issues and a strong desire to preserve and enhance the watershed's resource potential. There is also a broad-based interest in continuing the trend of markedly improved water quality and water use support in the Clark Fork and its tributaries resulting from the last two decades of pollution abatement activities.

E. EXISTING WATER USES

This section discusses the basin's existing water uses identified in the Steering Committee deliberations. The listing is alphabetical; it is not intended to imply that any use is more valuable or higher priority than any other. It indicates the wide spectrum of resource values the Steering Committee is attempting to balance in planning for the management of the basin water resources. This section also does not attempt to quantify the amount or quality of water necessary for these uses in the upper Clark Fork River Basin. It merely describes those uses and underscores their significance.

1. Aesthetics

The upper Clark Fork Basin has spectacular landscapes which are enhanced by the presence, quantity, and quality of its water resources. The North Fork and Landers Fork of the Blackfoot and Boulder Creek are examples of streams in the basin whose headwaters are virtually untrammeled wild landscapes and watercourses. Native natural processes dominate these aquatic systems. The Clearwater River with its chain of lakes, Rock Creek, Georgetown Lake, and portions of the lower and upper Big Blackfoot River, are examples of areas with high aesthetic values that are major attributes to the recreation and tourism industry. The Deer Lodge Valley, Nevada Creek Valley, Threemile Valley, Flint Creek Valley, and Klienschmidt Flat areas are representative of settled agricultural areas where water has been used to manipulate natural landscapes and vegetation but landscape values remain high.

Use of water resources in other cultural and economic activities have impacted the aesthetic values of the landscape in less desirable ways. Basin stream corridors provided ideal topography for transportation and utility corridors, uses that have had adverse visual and physical impacts on the watershed. Portions of these valleys are geologically confined and the impacts of transportation and utility routes dominate the landscape. The Clark Fork River from Milltown to Garrison is perhaps the most striking example. Silvicultural, hydroelectric generation, and mining activities also have had varying physical and visual impacts throughout the basin, some of which have significantly modified the visual and physical landscape. The largest and most noticeable are those at the headwaters associated with the Anaconda/ARCO operations in the Butte and Anaconda areas.

Communities of the basin have altered the landscape and natural water resources, but continue to rely on both as a key ingredient of the their quality of life. Missoula's River Front Park is an excellent example of how basin communities have recognized the value of water resources. The Clark Fork River runs through town and its banks were once used as a dump, industrial storage yard, and transportation corridor. The City has, however, cleaned up and re-vegetated the river front, and it is now an aesthetically pleasing site for recreation.

2. Agriculture

Agriculture dominates land use and economic activity in much of the upper Clark Fork Basin. Most of the crop production is used for livestock feed. Irrigation increases and stabilizes this production which in turn stabilizes the livestock carrying capacity of most operations.

The floodplains and terraces of the Clark Fork River and its tributaries support dry land pasture, irrigated pasture, and crops. The major crops grown are grass hay, alfalfa, and small grains such as barley and spring wheat. Both flood irrigation and sprinklers are used extensively.

Very little land is irrigated by direct pumping from the Clark Fork River. Most irrigation occurs on terraces or benches using water from tributaries that have been diverted at higher elevations. In the Big Blackfoot, Little Blackfoot, Flint Creek, and Rock Creek watersheds, little water is pumped directly from the mainstem. Ditch irrigation diversions are much more common and tributary stream ditches continue to play a dominant role in water supply.

The productivity of agricultural land varies greatly. Rangeland along the valley bottoms and terraces produce a maximum of 0.25 animal unit month (AUM) per acre. Alfalfa hay on moist floodplain soils yields an average of 2.0 tons per acre and provides approximately 1.0 AUM per acre of grazing. Alfalfa under full service irrigation yields an additional 1.0 AUM per acre and an average of about 2.5 tons per acre. Irrigated small grain crops such as barley yield 60-80 bushels per acre.

3. Domestic

Water law does not define domestic water use. Administratively, the DNRC generally assumes it to include in-house domestic needs - drinking water, culinary, cleaning - and up to 1/4 acre of lawn and garden irrigation. Claims filed in the state's general stream adjudication have included as domestic use up to five acres of lawn, garden, and shelter belt irrigation. The Legislature's 1991 temporary closure of the upper Clark Fork River Basin defined domestic use as the use of water common to family homes, including use for culinary purposes, washing, drinking water for humans and domestic pets, and irrigation of lawn or garden of less than 1 acre not to exceed a total volume of 3.5 acre feet per year.

Small wells (wells 8" diameter or wells supplied by 0.5 to 0.75 hp pumps) are the most common individual domestic water supply systems in the basin outside of cities with municipal water systems. Some developments of springs for domestic use have occurred at scattered, low density recreational cabin sites. Surface water is a significant source for in-house domestic water supply only in one area of the basin. Because of limited ground water availability in portions of the Clearwater River drainage, recreational cabin and summer home sites, especially along the lake shores, rely upon surface water supplies for in-house domestic use and lawn and garden irrigation.

Ground water supplies, typically wells and springs, that provide less than 35 gallons per minute and less than 10 acre feet per year are exempt from the states water right permitting process. However, a water right is still needed. A statutory exemption process allows the ground water appropriator to develop, put to use, and then file an application - notice of completion - for their water right.

The Steering Committee and watershed committees generally agreed that growth in the demand for domestic water supply, especially in rural areas, would continue. Substantial increases in water use could occur if the demand for rural subdivisions and private recreation sites continue to grow. It was also generally agreed that surface waters would not and should not be the source of future domestic water supplies.

4. Fisheries

> "The Clark Fork River ecosystem is not just that water that maps call the Clark Fork River. This ribbon of surface water interacts with ground water, with the local climate, with the landscape through which it passes, and with the tributaries that feed it. These interactions acting over time determine the river's nature or overall condition ."[1]

The river is, in effect, the valley's "bottom line" where the cumulative effects of all land and water uses are reflected in the river's water quantity, quality, habitat, and the life it supports. Fish populations are important components of the Clark Fork ecosystem

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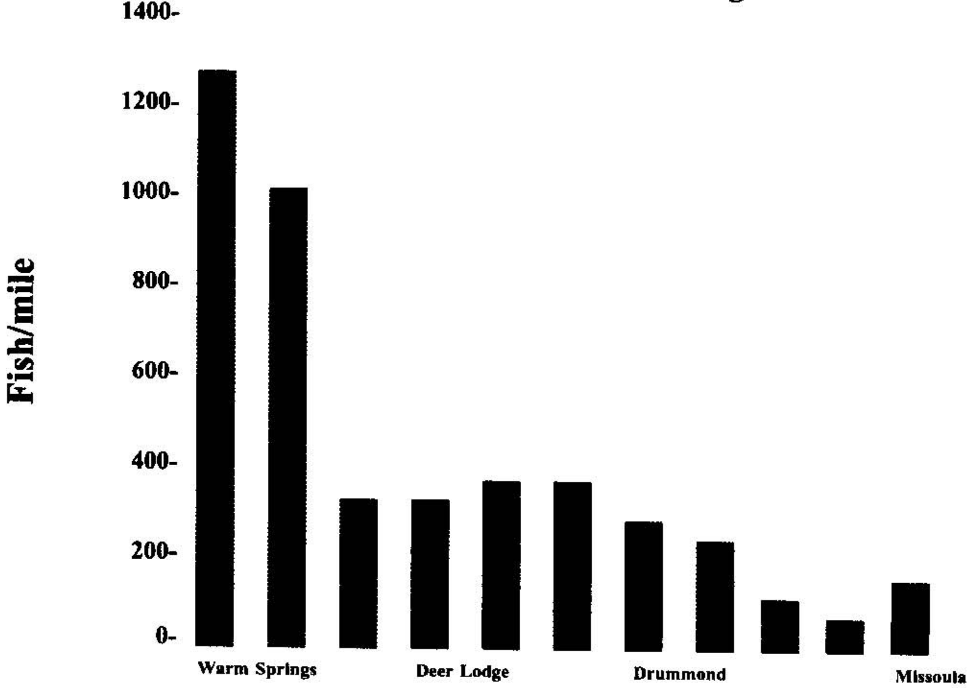
[1] Watson, V. 1985. A Synthesis of Water Quality Problems in the Clark Fork River Basin. Proceedings - Clark Fork River Symposium. Montana Academy of Sciences. Montana College of Mineral Science and Technology. Butte, Montana.

which, through their diversity and vitality, indicate how well the interactions between climate, land, and water are being managed.

The upper Clark Fork River mainstem is primarily a brown trout fishery with occasional rainbow, westslope cutthroat, brook, and bull trout and mountain whitefish. All species except brown trout and mountain whitefish occur in numbers too low to estimate by conventional estimating techniques. Brown trout numbers are relatively high below the Warm Springs settling ponds where toxic water from the Butte mining area is treated to reduce metals concentrations. However, trout numbers fall off rapidly a few miles below the ponds to a level which remains relatively stable downstream to the Bearmouth area, where they decline to the lowest numbers in the river. Below the mouth of Rock Creek, brown trout numbers rebound and rainbow trout become an important component of the fishery (Figure 1).

FIGURE 1
Brown Trout Abundance
1989 - 1991 Average



Tributaries to the upper Clark Fork are the breeding grounds for trout and other species which inhabit the main river. Brown trout move into the tributaries in the fall and lay their eggs in shallow depressions, called redds, dug by the females in the streambed gravel. The eggs remain in the gravel until spring, when they hatch. The young remain in the tributaries up to two years before they move to the main river to mature and repeat the cycle. Other species, such as whitefish and suckers may also use the tributaries for spawning. Successful completion of fish life cycles requires a reasonable quantity of clean water, clean streambed gravel, good hiding cover such as log debris jams, undercut banks, and overhanging vegetation. Thus, considerations of the river as a whole must include the tributaries as vital components.

Nearly all of the upper Clark Fork tributaries also have resident fish populations. The mountainous headwaters of most of the tributaries, such as Warm Springs, Lost, Dempsey, and Racetrack creeks, support vital reserves of native westslope cutthroat and bull trout, both of which are species of special concern in Montana because of declining numbers and available habitat. Non-native species, such as brook, rainbow and brown trout, enter the populations as one progresses out of the mountainous reaches downstream to the foothill and valley bottoms.

The mainstem Clark Fork has the potential to be a "Blue-Ribbon" trout river. The usual measures of stream productivity (alkalinity, hardness, and total dissolved solids) indicate that it should be as productive as Montana's finest trout waters such as the Big Hole, Ruby, and Blackfoot rivers, and Rock Creek. However, comparable habitats in these other rivers produce two to three times more trout than the Clark Fork River primarily because of the presence of toxic metals in the Clark Fork.

5. Industrial and Mining

Mining and mineral processing created the initial and largest growth in the upper Clark Fork Basin and stimulated the area economy. Gold and silver exploration drew a large number of prospectors to the area in the 1800's, and every watershed in the basin had some level of exploration or development. The largest and most significant long term mining and processing operations in the basin were the copper mines and processing facilities in the Butte and Anaconda area. The growth of mining created demand for agricultural production, wood products, transportation, and hydroelectric power.

Mining and industrial operations have lessened in the basin with the closure of ARCO (Anaconda) operations in the late 1970's. Montana Resources Inc. continues to operate a portion of the Butte operations. A number of small scale privately owned operations, predominately placer gold operations, remain active and scattered throughout the basin. Beal Mountain mines gold via a heap leach processing operation south of Gregson Hot Springs (Fairmont) in the upper Deer Lodge Valley. Seven-up Pete Joint Venture is conducting reconnaissance and planning for a potentially large hardrock gold mining operation just east northeast of the mouth of the Landers Fork, a tributary to the Big Blackfoot River. Permitting activities for this mine will begin during the fall of 1994.

Early mining and mineral processing made great demands on water, and as was true throughout the western states, Montana's water laws were developed by the miners. In the 1800's, water was used to provide mechanical power as well as directly in the mining, milling, refining, and smelting processes. Later, rivers and streams were harnessed to generate electricity also used in mining and related processes. Water demands have changed in all industries. Public demand and statutes require better waste management and treatment. Industrial processes have become more efficient and less consumptive. These features have lessened industry's, including mining's, demand on water.

6. Municipal

Municipalities in the basin rely on both ground and surface water for their public water supplies. Butte relies on surface water, a portion of which is diverted from the Big Hole Basin. In response to the age and deteriorating conditions of its existing system, Butte is upgrading and rebuilding its Big Hole water supply system. Historically, Anaconda utilized water from the Georgetown\Silver Lake System. Anaconda has begun construction and expansion of its water supply system that relies entirely on groundwater wells along Warm Springs Creek. Although it formally diverted water from Cottonwood Creek, Deer Lodge now utilizes groundwater wells for its supply. Philipsburg imports water from Fred Burr Lake and Fred Burr Creek. Missoula uses a series of ground water wells for its municipal supplies. Groundwater studies indicate a strong relationship between Missoula's ground water and Clark Fork River discharge. The town of Seeley Lake utilizes an infiltration gallery which pulls water from the lake.

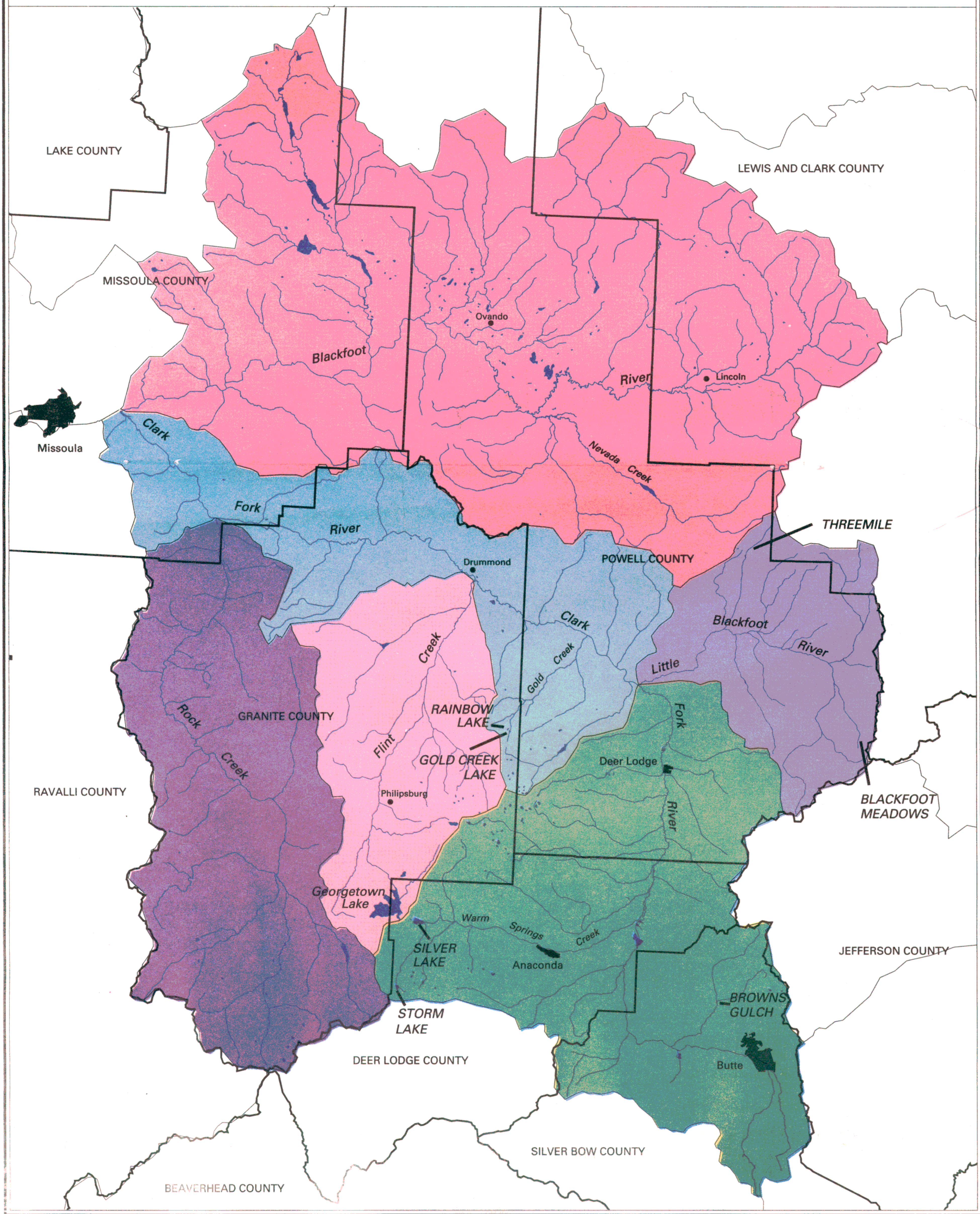
Upper Clark Fork River Basin

Legend

- Hydrologic Basin Boundary
- Stream or River
- County Boundary
- Lake or Pond
- City

Map Prepared By
Montana State Library
Natural Resource Information System
Map #95epa20 - 12/9/94

1:600000
1 inch = 9.47 miles



Residents of many small towns including Lincoln, Ovando, Potomac, Hall, Maxville, Clinton, and Piltzville rely on individual or small multi-family wells.

7. Power Generation

The Montana Power Company (MPC) owns two hydroelectric dams and generating plants in the upper Clark Fork, Flint Creek dam near Georgetown Lake and Milltown dam near Missoula. There are two additional dams and power generating plants on the Montana reach of the Clark Fork River, Thompson Falls owned by MPC, and Noxon Rapids owned and operated by the Washington Water Power Company (WWP). All of these hydroelectric facilities use water for storage and power generation.

The Flint Creek dam began as a small earth dam built in 1885 to provide power for the Bi-Metallic Mining Co. at Philipsburg and Granite. The dam was purchased by the Anaconda Copper Mining Co. in 1901. In 1919, the Anaconda Co. raised the dam to its current level, and in 1925 the entire project was transferred to MPC. MPC generated power at Flint Creek until November 1989 when the woodstave flowline to the power house ruptured. MPC is currently in the process of transferring the Flint Creek project and its FERC (Federal Energy Regulatory Commission) license to Granite County. The adjudication of the water rights for the Flint Creek project are presently stayed by the Montana Water Court.

The Milltown dam was developed by Butte copper king W.A. Clark to power the sawmill at Bonner. Milltown's electricity also ran electric lights in Missoula and an electric railway service running between Missoula and Bonner. The water rights at Milltown have a 1904 priority date. Milltown dam is a small facility. It generates 3.4 megawatts, using 2,000 cubic feet per second (cfs) and up to 1,451,556 acre-feet of water a year (af/yr) to generate power, and 940 cfs for storage. At times, more than half the water flowing through the dam is from the Blackfoot River. MPC's water rights at Milltown will therefore be adjudicated in three basins: two Clark Fork River sub-basins (76G and 76M) and the Blackfoot (76F).

Thompson Falls dam was completed in 1917. It was developed to provide power for sawmills at Thompson Falls, the mines in the Coeur d'Alene region and the Chicago, Milwaukee and St. Paul Railroad. Based on notices of appropriations, the priority dates for MPC's water rights at Thompson Falls range from 1905 to 1909. Thompson Falls' historic total generating capacity is 40 megawatts. It uses 11,120 cfs and up to 8,050,508 af/yr for generating power, as well as 7,547 cfs for storage. MPC's water rights for Thompson Falls were decreed as part of Basin 76N. The company is currently expanding the facility to generate another 50 megawatts.

Completed in 1960, Noxon Rapids dam is owned by Washington Water Power, a utility company smaller than MPC. Noxon Rapids has a nameplate generating capacity of 466.2 megawatts, and serves ratepayers in northern Idaho and eastern Washington. WWP's water rights at Noxon Rapids total 55,400 cfs. Of this, 40,400 cfs are decreed rights - 35,000 have a priority date of Feb. 20, 1951 and 5,400 have a priority date of April 3, 1959. The decreed rights include 29,248,264 af/yr for power generation; 267,000 af/yr to maintain minimum reservoir elevation; 230,700 af/yr used once a year for stream flow regulation; and 38,400 af/yr usable at any time to meet electric-system load requirements and regulate stream flows. An additional 15,000 cfs were granted in a provisional water use permit issued by the State of Montana in 1976.

All the tributaries of the Clark Fork River contribute water for beneficial use and reuse at the downstream dams. Because they are hydrologically connected, the large hydroelectric water rights on the Clark Fork River affect the availability of water in the river's upper reaches. Because the hydroelectric water rights are large, many existing and all new water allocation activities in the Clark Fork River Basin potentially affect the ability of the power companies to exercise their water rights. The Clark Fork River doesn't have enough water to fill these hydroelectric water rights year-round. Milltown, the smallest of the dams, generally has only enough water to satisfy its rights April through June. According to a 1988 Montana Department of Natural Resources and Conservation study, Noxon Rapids dam's water rights are satisfied an average of only 22 consecutive days a year, generally late May to early June. A 1988 Montana State University study concluded that additional diversions above Noxon cause a direct reduction in power generation at the dam.

8. Recreation

The upper Clark Fork River Basin includes large blocks of public and private land supporting a wide range of recreational sites and activities such as fishing, hunting, camping, boating, white water rafting, mountain biking, snowmobiling, wildlife observation, and site-seeing. The public lands in the basin include designated wilderness and roadless areas and historic sites. Recreation is a major contributor to the basin's economy, and most recreational activities rely on water resources to enhance the recreation experience.

Recreation on the Big Blackfoot River mainstem is rooted in fishing, but over the last 20 years floating and rafting along the lower corridor has increased significantly. The lakes of the Clearwater River drainage draw residents from across the state and elsewhere for water-based recreation.

Fishing is the dominate water based recreation activity on lakes, rivers and streams through-out the basin. Two of the basins watercourses, the Big Blackfoot River and Rock Creek have been singled out and included within Montana's "blue ribbon" fisheries. As has been mentioned elsewhere, the DFWP was granted in-stream flow rights, known as Murphy Rights, to protect the Blackfoot and Rock Creek fisheries.

The Blackfoot River is also heavily used by floaters. The DFWP has created a special recreation corridor on the river and manages it in accordance with rules developed through agreement with local land owners. The agreement allows the land owners to exercise control over recreation issues such as the location of parking areas and camp and access sites. The land owners, in return, allow recreationists greater access to their lands than would otherwise be the case.

9. Storage

Construction of water storage projects is a water management tool historically used throughout the basin to save water. A primary source of water for the upper Clark Fork Basin is winter snowfall. This snow melts during the spring and early summer and the resulting runoff discharges though the basin. Some of it infiltrates the soil profile, stream banks, and beds and recharges ground water aquifers. Most of the water, however, leaves the basin during the spring flushing flows. Storage holds high spring flows for use later in the year.

Water can be stored two ways: behind dams and in the ground. The existing dams in the basin are shown in Figure 1. While they provide other benefits such as flood control and recreation, these dams were constructed primarily to support irrigation. A second method for storing spring runoff involves the use of irrigation return flows. Irrigation water applied in excess of plant needs is stored in the alluvial fill water table, and with some delay travels back to the stream. Actual amounts stored and the timing of return flows depend on local conditions, including the amount of water applied, amount used by crops, and soil conditions.

10. Superfund

Activities of the Superfund Program will play a major role in the future of the upper Clark Fork Basin. The Superfund program was created in 1980 by Congress to: identify, investigate, and cleanup hazardous substances, pollutants, and contaminants that have been or may be released into the environment. EPA initiated Superfund activities in the upper Clark Fork Basin in 1982 to address problems resulting from over 100 years of mining and processing operations, and related wood treating operations.

Problems at the four designated Superfund sites in the upper Clark Fork Basin have been prioritized by EPA with input from the State of Montana, ARCO (the major responsible party), and others. Since the first master plan in 1988, a great deal of investigation and cleanup activities have occurred. While the Superfund program initially focused much of its attention on human health related problems, environmental concerns in the river system have also been addressed.

The following does not attempt to describe the entire range of Superfund activities, which in 1994, involved construction by ARCO of projects valued at more than $100 million , but rather focuses on the activities most related to the river system. Several major Superfund projects - for example, the Berkeley Pit Mine Flooding and the Anaconda Old Works - are not discussed because they do not relate directly to the river system.

The Warm Springs Ponds serve as a vital treatment system that reduces the toxicity of metals in Silver Bow Creek, and allow a fishery to exist in the upper Clark Fork River. Construction of the final components of the remedy to improve treatment and contain metal contaminants will occur near the end of 1994. Completion of this project will eliminate fish kills caused by runoff from tailings, provide cleaner water for downstream users and the aquatic environment, and help stabilize flows up to the 100 year flood event by capturing and treating all such flows.

Efforts will begin in late 1994 to review existing information and plan detailed investigations on the Clark Fork River from the Warm Springs Ponds to Milltown Reservoir. An extensive effort is anticipated to obtain input from local interests in planning this work. A cleanup decision may be made in 1996, with actual cleanup work beginning the following construction season. Stream bank stabilization, especially as affected by cattle grazing, will be one of the key issues to be addressed.

In 1993, EPA decided to continue investigating the contamination at Milltown Reservoir and evaluating cleanup alternatives. A final decision is expected in 1996 this area, particularly the contaminated groundwater at the site and issues relating to the stability and permanence of the Milltown Dam.

Another major activity affecting the upper Clark Fork Basin is the removal of contaminated soils and tailings at the Reduction Works/Colorado Tailings in Butte. The second year of an approximate five year cleanup is currently underway, with the wastes being hauled to the Opportunity Ponds near Opportunity. This cleanup will significantly reduce the metals that currently wash down Silver Bow Creek and into the Warm Springs Ponds.

An on-going investigation of techniques for cleaning up Silver Bow Creek from Butte to the Warm Springs Ponds is anticipated by EPA to be the final major Superfund activity currently underway on the river system. A decision on how to clean up contaminated streambank tailings and bed sediment will be made in 1995, after significant opportunity for public input. Construction will likely begin the following year. The cleanup of Silver Bow Creek, if successful, may ultimately reduce the need for the

Warm Springs Ponds as a treatment system and allow for a natural fishery to be re-established in Mill, Willow, and Silver Bow creeks.

Water rights implications for each of these projects is examined during the investigation portion of each of the cleanup projects. EPA and the responsible parties consult closely with the DNRC concerning this analysis. For those cleanups being implemented, the DNRC determined that the Warm Springs Ponds cleanup required limited water rights for limited purposes. ARCO, as site owner, received water use permits for the wildlife management pond and the Pond 2 tailings cover, and will soon apply for a permit for the inactive area. ARCO is also investigating appropriate means for augmentation or replacement of existing water for the permitted Warm Springs activities, in consultation with the DNRC and EPA.

For future projects - Milltown Dam, the Clark Fork River, and the Silver Bow Creek cleanups - water rights analysis will occur in conjunction with remedy selection. Water rights implications will be presented with the analysis of various cleanup alternatives, prior to response or remedy selection. EPA and the State of Montana will monitor compliance with state water law as these remedies are implemented.

The state of Montana is pursuing a natural resource damage claim and restoration plan separately. Water rights will be examined for those actions as well, and the state will comply with state water law as it implements these actions.

Because Superfund activities are being addressed in other legal and administrative processes, with one exception, this plan does not make recommendations regarding them. The exception is a limited exemption from the recommended closure of the basin to most new surface and ground water rights. (See Section V *Closure of the Basin to New Water Rights Permits.*)

11. Transportation

The Blackfoot River has a colorful history of "river pigs" guiding massive old growth timber down the river to lumber mills. Lakes in the Clearwater River drainage were dammed with low structures to store water and hold logs until they could be floated downstream for processing. The basin's rivers and streams are no longer used to transport commodities. Water craft today are recreational. Kayaks, rafts, canoes, float tubes and, on the lakes, motor boats pull skiers or carry fisherman. Water leaving the state also supports the flow of the Columbia River which cheaply transports Montana commodities such as wheat to Pacific ports.

The basin's river and stream corridors were also historically important transportation routes, and they remain so today. The highly dissected mountain ranges forced traffic to travel along the rivers in or through the basin. The Lewis and Clark expedition followed a Native American travel way from the mouth of the Blackfoot River upstream to the Landers Fork, then overland to Alice Creek, and finally over the Continental Divide and down Green Creek. The first transcontinental railroad was completed through the basin with the meeting of the east and west ends near Gold Creek on September 8, 1883. It passed through Helena, down the Little Blackfoot and Clark Fork rivers and on to Spokane, Washington. By 1910, two railroad beds and a vehicle road followed the river from Missoula to Butte and Helena . Today the railroad beds remain, although since 1970 only one is active.

The railroads have been joined by an interstate highway, a secondary access road, various spur roads, and utility corridors. A major gasoline pipeline also follows the Clark Fork River. In the 1980's, a fiber optics communication line was buried along the railroad right-of-way through the basin. A major high voltage electricity transmission line roughly follows the Clark Fork River in its route from Colstrip in eastern Montana to the west where it joins the west coast transmission network. This line enters the basin north of Deer Lodge, crosses the valley, and bisects the mainstem's southern tributaries. The line does not follow the valley floor.

F. EXISTING WATER SYSTEM MANAGEMENT

1. Overview

As explained in Section III A, Montana's statutes on water quantity management are based on the "First in Time is First in Right" doctrine. This legal doctrine provides for the distribution of the available water resource according to the priorities set by the earliest date of water development and use. A shortage of water is usually needed to stimulate concern with its use and allocation.

Water management activities in a basin are often a reaction to local water conditions. Typically, water users focus on their individual water management operations. Individual management options and the associated water rights tend to be reviewed or modified only when conditions change. Examples of such changed conditions include an influx of new users or nontypical uses, pollution problems, or natural events such as drought and flood. Reacting to change does not always result in mutual management benefits and may result in conflict. Long-term, collective water management by groups of users is not widespread. Management to accomplish specific goals through a wide range of water availability or use conditions for a given stream or watershed is normally associated with operation of a water storage project.

a. Informal Stream Management

The most common, but least noticed and least understood, form of water management is the informal communication between water users on a given ditch or stream reach. Rural water users tend to be united by a shared emphasis on community and common economic and cultural goals. Because they often know each other and have some understanding of their neighbor's needs, local water users are often able to maintain open and honest communication about water issues and to negotiate resolution of conflict or sharing of the resource.

Since they are typically responses to short-term water availability, informal issue resolution tends to be short-term. However, occasionally these agreements become formalized through memorandums of agreement, contract, or stipulation. Sometimes these documents are recorded and become appurtenances to the land. Water use agreements or management activities which follow the general precepts of the appropriative water law have support in the legal system.

b. Water Commissioners

Water users relying on water from a storage reservoir or from a decreed stream can petition the district court and have a water commissioner appointed. (A decreed stream is one where the water rights have been identified and quantified, including setting the date of first use through a court decision.) The water commissioner is authorized to distribute and "police" the use of available water. Use of a commissioner on most streams is primarily reactive management. Typically, a commissioner distributes water only in times of shortage.

A commissioner allocates available water based on water right priority dates and limits as set by a decree. A sharing of shortages typically occurs only among those water users having the same priority date. In complex basins where return flows are understood, experienced commissioners may manage deliveries according to priorities modified by an understanding of the sub-basin hydrologic system. Under these circumstances a water commissioner may deliver water to upstream junior users when return flows assure adequate supplies to a downstream senior user. A commissioner distributing stored water separates natural flow from releases of stored water and then delivers the stored water to its owners. Disputes concerning a commissioner's distribution activities are settled by a hearing before the local district court.

2. Upper Clark Fork Basin Water Management Activities

Water management activities on individual streams throughout the basin reflect the users reaction to local development, water availability, and other users management. Hence, the intensity of management and issues addressed differ. The following is a brief description of water management in each of the basin's six watersheds.

a. Upper Clark Fork Mainstem and Tributaries

This portion of the basin, which includes the mainstem and tributaries above the Little Blackfoot River, has a long and colorful history of water right development, management, and litigation. Many of the tributaries to the river are decreed. Historic competitive demand for water by mining, agriculture, and public water supplies required court adjudication, settlement of management disputes, and distribution of available water supplies. The Montana Water Court's Upper Clark Fork Temporary Preliminary Decree issued in May 1985 under the state's general stream adjudication includes this watershed, but to date this decree has not been utilized for water management.

Water commissioners, administering both decreed and stored water, are very common in this watershed. For example, appointment of a water commissioner is an annual event on streams such as Dempsey, Racetrack, and Cottonwood creeks as well as others. This more detailed water administration typically does not, however, extend to the river's mainstem. In recent drought years, low water levels in the mainstem have been an issue of broad public interest extending beyond the watershed because of fishery and water quality concerns.

The National Dam Safety Inventory identifies 51 water storage facilities in this watershed. Many of these are dams that augment storage in high mountain lakes. These facilities, which are typically owned and controlled by a single or small group of private owners, increase available water supply on tributary streams during the irrigation season. The Twin Lake Creek, Storm Creek, Storm, Georgetown, and Silver Lake complex is the most well known and largest storage system in this watershed. Basin water users have considerable interest in the continued use of this 50,000 acre feet of storage. This system was developed to supply mining and smelting water demands in Butte and Anaconda, as well as some municipal and agricultural demands. Portions of the system, including the pumped storage out of Georgetown Lake, have been inactive since the closure of ARCO's Butte and Anaconda operations. If the inactive portions were reutilized, it may be possible to increase the available active water storage significantly.

b. Little Blackfoot River

Land use patterns in the Little Blackfoot watershed have not changed substantially in recent years. Water management also follows traditions established much earlier. Agriculture dominates the present diversionary water use. Historically, mining was a significant water user on a number of the river's tributaries. This watershed does not have any significant storage projects or water users associations.

Most of the streams in the watershed are not historically decreed. The Threemile drainage and Ophir Creek are exceptions. The Upper Clark Fork Temporary Preliminary Decree, issued by the Montana Water Court in May 1985, includes the Little Blackfoot watershed.

Water users in parts of the drainage, such as Threemile Creek, are improving local water management and administration through diversion structure repair and installation of standardized water measurement devices - Parshall flumes. With these infrastructure improvements, and conformance to the existing decree, water distribution is becoming more accurate, thereby reducing potential conflict and enhancing local management. A water commissioner may still be utilized in low water years.

c. Upper Clark Fork River - below the Little Blackfoot

Excluding Rock Creek and Flint Creek tributaries, this portion of the basin is dominated by smaller, disconnected, irrigated fields scattered along the valley bottom. Historically water conflicts existed on tributary streams such as Donovan, Dirty Ike, Cramer Sixty Springs, and Gold creeks, and Rock Creek near Garrison. Such conflicts were typically limited to a few, often one or two, individuals. The only historic decrees in this watershed were developed to settle these disputes. In recent years, water commissioners have rarely been appointed.

The Montana Water Court's Upper Clark Fork Temporary Preliminary Decree, issued in May 1985 under the comprehensive general stream adjudication, includes this watershed. To date, this decree has not been utilized for water management or allocation.

The lower reaches of the upper Clark Fork River Basin include only one major storage project, Montana Power Company's Milltown dam. MPC has a significant early water right (December 11, 1904) associated with it's hydropower generation at this dam. This right for 2,000 cfs peak demand may have significant effects on water management above it. To date MPC has not made a call for water to protect its right during periods of low flow. There are also some small high mountain lakes on tributaries in this watershed which have been enhanced for storage. Rock Creek Lake is a privately owned, active storage facility, which is used to export water into the Deer Lodge Valley. Gold Creek Lake was once utilized for storage, but is presently inactive.

d. Flint Creek Watershed

Flint Creek is a complex basin. This drainage's natural confinement by the canyon between the mouth of Boulder and Marshall Creeks separates the watershed into an upper and lower basin. This natural divide also resulted in the historic development of somewhat isolated upper and lower basin water management activities and decrees. An upper basin decree was developed in conjunction with the Georgetown Lake hydropower plant. A lower basin decree was needed early in the lower basin's history to settle water right priorities in that area. A Temporary Preliminary Decree, under the state's comprehensive general stream adjudication, was issued for Flint Creek by the Montana Water Court in March 1984.

The Flint Creek watershed includes four storage reservoirs. Water from Rock Creek's East Fork Reservoir is transported over the Trout Creek divide and throughout the watershed. The discharge from Georgetown Lake is required by the decree to emulate the natural stream flow through the irrigation season. Fred Burr reservoir provides water to upper basin users, including the town of Philipsburg. In the lower portion of the watershed, the relatively new Willow Creek reservoir provides water in the Willow Creek drainage. East Fork and Willow Creek waters are the most widely used and intensely managed in the watershed. Water commissioners are needed to separate stored water from "natural" flows and deliver it from these projects every year. Water commissioners are also appointed to distribute historically "decreed" water in water-short years.

Flint Creek watershed residents have become much more active in water management. A county watershed committee was created to address water management and policy in 1984 after the issuance of the Temporary Preliminary Decree. Presently, three county or watershed committees are examining water issues, including the Flint Creek watershed committee advising the Steering Committee, the Granite County Water Resources Basin Committee, and a water subcommittee active in the development of the county comprehensive plan. These committees are supporting a basin wide cooperative return flow study.

The return flow study is a water quantity focused data collection and modeling effort designed to increase understanding of how water flows through the watershed. Local water users, individually and through group representation, in cooperation with the DNRC, DFWP, U.S. Bureau of Reclamation, U. S. Soil Conservation Service, and the Granite Conservation District have initiated a five year basin-wide study of water supplies under the existing water use regime. With this baseline data, local water users will be able to develop and implement a local water management system. The data collected will provide all parties the ability to assess and adapt to the inevitable annual variations in precipitation and changes in land use. It may also assist local users to determine where limited resources should be focused when evaluating water development and infrastructure improvements.

e. Rock Creek Watershed

Streams in the Rock Creek watershed are generally not subject to intense water management. Local water users share and deliver water under local agreements or informal enforcement of priorities. The most formalized water management activities in the watershed are linked to the storage and delivery of water out of the East Fork Reservoir located on the East Fork of Rock Creek. Most of this water, however, is exported out of the watershed and into Flint Creek. The Flint Creek Water Users Association, the contract manager of the state-owned East Fork Reservoir, is responsible for the passage of natural flows through the reservoir during the irrigation season. Passage of natural flows assures Rock Creek and East Fork of Rock Creek water users delivery of their water rights, especially those who are senior to the reservoir. Presently, seepage losses and return flow between the dam and the siphon intake are the primary method of "bypassing" this natural flow. At times this method of delivery has provoked question and controversy.

Some of Rock Creek's tributaries were historically decreed. In March 1984 a Temporary Preliminary Decree was issued for the entire watershed under the general stream adjudication program.

The DFWP has in-stream flow water rights, known as "Murphy Rights", in Rock Creek. These rights confer on the DFWP the option of calling on water users with rights having a priority date later than its Murphy rights (July 6 and 7, 1971) to curtail their water use during drought periods. However, in recent low flow years, the DFWP has not exercised this option. The DFWP has also not attempted to examine the water use by senior right holders to ensure that they are operating within the limits of their right. In other basins to date, the DFWP has limited calls for water to only mainstem junior water users. In Rock Creek, only one mainstem user has a right junior to the DFWP's Murphy right, but several Rock Creek tributaries in the lower watershed have additional junior users. The DFWP could, therefore, stimulate a comprehensive watershed-wide management scheme to protect its Murphy rights by: 1) including tributaries with the mainstem in their area for calls on junior users; 2) examining water use by senior water right holders; or 3) calling for appointment of a commissioner under the Temporary Preliminary Decree.

f. Big Blackfoot River

The Big Blackfoot River is the largest, and perhaps the most diverse of the watersheds. Very few of the water rights in the drainage have been the subject of an historic decree. The Montana Water Court has not conducted any adjudicatory actions in this basin and is not expected to do so within the next five years. The streams which do have historic decrees, (Union Creek, Elk Creek, Cottonwood Creek, North Fork Blackfoot, Warren Creek, Keep Cool Creek, and Lincoln Creek) have rarely utilized a water commissioner in recent years.

In the majority of the watershed's agricultural areas, landownership has retained a link to past operators and the "tradition" and pattern of historic water use has remained stable. This not the case in areas where land ownership is changing. Some ranches have shifted to absentee ownership, and the new owners are often unfamiliar with historic patterns of water use and water law. In portions of the watershed, agricultural tracts have been broken into small rural homesites, ranchettes, or recreational property that do not support historic water use patterns. These changes are resulting in increased water-related conflicts.

In the Clearwater River drainage, recreation rather than agriculture dominates water use. The Clearwater does include small farmsteads, and the most significant agricultural operations are located near the river's mouth. Lake- and streamside cabins, resorts, and recreational businesses occupy the accessible valley bottom. Sources of water for new recreational homesites and resorts are either small ground water wells or surface water. Surface water is being used because adequate ground water is often not available.

The Nevada Creek drainage is unique in this watershed because of its active, on-going water management activities. The state-owned Nevada Creek Reservoir, constructed in 1938-40, is operated by the Nevada Creek Water Users Association. Water deliveries in this drainage are regulated annually by a commissioner pursuant to several historic water decrees. The Water Users Association, the DNRC, DHES, DFWP, Soil Conservation Service, Bureau of Land Management, and U.S. Geological Service are cooperatively studying reservoir operations, water quality, and fisheries.

As is the case with Rock Creek, the DFWP has Murphy in-stream flow rights on the mainstem of the Big Blackfoot River. The priority date of these rights is January 6, 1971, and they cover the reach from the river's mouth upstream to the confluence of the North Fork. The DFWP has made a call on mainstem junior users to protect these rights three times. New water rights continue to be developed on the river's tributaries, especially in the Clearwater drainage. No clear management method has yet been developed to enforce priorities in water deliveries between new uses on the tributaries and existing mainstem demands.